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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,853	01/10/2005	Holger Thielert	THIELERT -3 PCT	2683
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COLLARD & ROE, P.C. 1077 NORTHERN BOULEVARD ROSLYN, NY 11576			EXAMINER MERKLING, MATTHEW J	
			ART UNIT 1795	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/520,853	Applicant(s) THIELERT, HOLGER	
	Examiner MATTHEW J. MERKLING	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4 and 5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keller et al. (US 2002/0134706) in view of Autenrieth et al. (US 5,935,277) and Stewen et al. (US 5,137,602) as evidenced by Sharma et al. (US 4,741,515).

Regarding claim 1, Keller discloses a reaction system for desulfurization of a gas stream (see abstract), comprising a boiler (40) lined with refractory material (53, paragraph 67), which comprises a combustion chamber/mixing zone (48) having an inflow opening (see left side of Fig. 2), a catalyst chamber (45) having a catalyst bed (47), and a chamber on the outflow side (see Fig. 2), having a gas outlet (56) for hot process gas, wherein the boiler (40) is configured as a

horizontal boiler (see Figs. 1 and 2), in which the combustion chamber (48), the catalyst chamber (45), and the chamber on the outflow (see Fig. 2) side are disposed next to one another, and that the catalyst chamber (45) is delimited, on both sides, in the flow direction, by gas-permeable checker bricks (thermal radiation barrier, (46)). Furthermore, Keller discloses the bricks (thermal radiation barrier, (46)) is made from a porous ceramic material which has elongated pores (paragraph 43).

Keller fails to teach a fill opening for introducing the catalyst bed.

Autenrieth also discloses a reaction system containing a catalyst.

Autenrieth teaches an opening (25) in the side of the reaction section (see Fig. 3) as a preferable way of easily removing catalyst (2) without requiring demounting operations on the reactor housing (col. 7 lines 4-35).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the opening in the side of the reaction section, as in Autenrieth, to the reaction system of Keller as a preferable way of easily removing catalyst without requiring demounting operations on the reaction section housing.

Furthermore Keller teaches a porous ceramic refractory element/radiation barrier (46) that is used in a high temperature service to pass a fluid flow, but teaches a solid porous ceramic material as opposed to the claimed checker brick form.

Stewen also discloses a high temperature ceramic apparatus that passes a fluid at high temperature (1800C, see abstract, col. 2 lines 53-64).

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Stewen teaches a checkered pattern to the ceramic apparatus in order to provide a uniform flow pattern across the entire ceramic apparatus (col. 2 lines 53-64). Furthermore, it is well known in the art that solid porous ceramic materials tend to provide for non-uniform flow (see Sharma, col. 1 lines 12-15 which discloses the inclination of porous ceramic refractory elements to non-uniform gas flow).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the checkered pattern of the ceramic apparatus of Stewen, to the radiation barrier of Keller, in order to provide a more uniform flow of gas.

Regarding claim 2, Keller, as discussed in claim 1 above, further discloses the flow opening and gas outlet are disposed on opposite faces of the boiler (see flow direction through boiler ((40) in Fig. 1).

4. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keller et al. (US 2002/0134706), Autenrieth et al. (US 5,935,277) and Stewen et al. (US 5,137,602) as applied to claim 1 above, and further in view of Vora et al. (US 6,280,609) and Apffel (US 4,597,788).

Regarding claims 4 and 5, Keller discloses the product from the reaction system described above is further treated in a catalyst bed (20) downstream of the boiler (40). Keller discloses that a portion of this product stream, after cooled in a waste heat boiler (60, which also serves as a means of condensing elemental sulfur and producing steam (see Fig. 2)) and condenser is heated

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back up by exchanger (24) and charge heater (16) prior to entering the catalyst bed (20).

Keller fails to teach that wherein on the circumference of the chamber on the outflow side, a line is connected, which opens into a process gas line adjacent to the boiler, in the opening region of the branch line.

Vora also discloses a reaction system.

Vora teaches a portion of an effluent stream (14) is used to preheat a stream (10) to a desired temperature prior to entering a reactor (18) in order to eliminate the need for a charge heater and subsequently reducing the capital cost of the reaction system (col. 9 lines 16-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to remove a portion of the effluent stream (as in Vora) from the chamber downstream of the catalyst chamber and prior to the waste heat boiler (of modified Keller) and connect this portion to the line directed from the outlet of the waste heat boiler (60 of Keller) to the catalyst bed (20) in order to utilize heat from the effluent stream more efficiently and eliminating the need for an extra heat exchanger or charge heater and subsequently reducing the capital cost of the reaction system.

Keller, as modified above, teaches the combination of two streams with substantially different temperature, but fails to teach a temperature control valve (valve body) on the outlet line from the chamber downstream of the catalyst chamber.

Apffel also discloses a system of combining two streams of substantially different temperature.

Apffel teaches a temperature control valve (34) that opens and closes a valve body which regulates flow of a temperature controlling stream (in this case, a refrigerant) in order to selectively control the temperature of a process stream (col. 5 lines 46-55).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the temperature control valve with adjustable valve body of Apffel to the line from the chamber downstream of the reaction chamber of the modified Keller in order to selectively control the temperature of the inlet stream to the catalyst bed (20) of modified Keller.

Response to Arguments

5. Applicant's arguments, see page 13, 2nd paragraph, filed 11/28/07, with respect to the rejection(s) of claim(s) 1-5 under 35 USC § 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Keller et al. (US 2002/0134706), Autenrieth et al. (US 5,935,277) and Stewen et al. (US 5,137,602).

More specifically, Applicant's argument on page 13, which implies that modified Keller does not contain the checker bricks, as recited in claim 1, is persuasive.

6. Applicant also presented other arguments in the reply filed 11/28/07 which are not persuasive.

First, on page 9, Applicant argues that Keller is entirely silent as to the shape of the boiler. The examiner respectfully disagrees. Keller clearly indicates in Figs. 1 and 2 that the boiler 40 is clearly in the shape of a cylinder.

Second, Applicant, on page 10, argues that Autenrieth is nonanalogous art. In response to this argument, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, both Keller and Autenrieth disclose reactors, albeit for different reactions, that contain "loose" catalyst (as mentioned by Keller in paragraph 45). The modification of Keller to rectify the deficiency of Keller would have been obvious to one of ordinary skill in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./

Examiner, Art Unit 1795



ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER